

AMENDMENTS TO THE CLAIMS:

Complete Listing of Claims

1 1. (previously presented) Apparatus for simultaneously making electrical
2 contact with an array of spherical contact points having a first selected pattern on
3 a circuit, comprising:

4 a support substrate having a working surface and a back side, said
5 support substrate defining a multiplicity of apertures extending from said
6 backside through said substrate and terminating at said working surface
7 according to a second selected pattern corresponding to a mirror image of said
8 first selected pattern;

9 a multiplicity of conductive probes, said conductive probes extending from
10 a first end at said back side of said support substrate, through said apertures to
11 a contact end located a selected distance beyond said working surface wherein
12 said contact ends of said conductive probes are substantially flat;

13 at least one aperture of said multiplicity of apertures including at least two
14 conductive probes extending there-through;

15 a multiplicity of conductive pathways extending from said first end of said
16 conductive probes to selected circuitry; and

17 said conductive probes positioned through said support substrate to make
18 electrical contact with the spherical contact points on a circuit placed against said
19 apparatus.

1 2. (currently amended) The apparatus of Claim 1 wherein said conductive
2 probes have a footprint at least as large as a the solder ball diameter of the
3 spherical contact points.

1 3. (original) The apparatus of Claim 1 wherein said contact points are
2 conductive bumps or balls.

1 4. (original) The apparatus of Claim 1 wherein said at least two conductive
2 probes extending through said at least one aperture are connected one each to
3 a voltage source line and a voltage sensing device.

1 5. (previously presented) The apparatus of Claim 4 further including a third
2 conductive probe connected to another voltage source.

1 6. (original) The apparatus of Claim 1 wherein said apparatus is a probe card
2 for testing integrated circuits

1 7. (previously presented) Apparatus for simultaneously making electrical
2 contact with an array of spherical contact points positioned according to a first
3 selected pattern on a circuit comprising:
4 an insulating support substrate having a working surface and a back side;
5 a multiplicity of conductive probes, each of said conductive probes
6 extending from a first end at said backside of said substrate, through said
7 substrate to a contact end, contact ends of said multiplicity of conductive probes
8 extending a selected distance beyond said working surface and terminating at a
9 multiplicity of locations arranged according to a second selected pattern
10 corresponding to a mirror image of said first selected pattern and wherein said
11 contact ends of said conductive probes are substantially flat;
12 at least two conductive probes of said multiplicity of conductive probes
13 having their ends adjacent each other at a single one of said multiplicity of
14 locations; and
15 said contact ends of said conductive probes positioned through said
16 support substrate to make electrical contact with selected ones of said spherical
17 contact points on a circuit placed against said apparatus.

1 8. (original) The apparatus of Claim 7 wherein at least two of said multiplicity of
2 locations include at least two of said conductive probes.

1 9. (original) The apparatus of Claim 7 wherein at least two of said multiplicity of
2 locations include at least three of said conductive probes.

1 10. (original) The apparatus of Claim 7 wherein said apparatus is a probe card
2 for testing integrated circuits.

1 11. (currently amended) A method of manufacturing apparatus for
2 simultaneously making electrical contact with an array of spherical contact points
3 on circuitry, said array of contact points positioned according to a first selected
4 pattern, comprising the steps of:

5 providing a support substrate having a working surface and a backside;

6 defining a multiplicity of apertures extending from said backside through
7 said substrate and terminating at said working surface according to a second
8 selected pattern, said second selected pattern corresponding to a mirror image
9 of said first selected pattern;

10 extending each of a first end of a multiplicity of first conductive probes
11 through each aperture of said multiplicity of apertures such that a first end of
12 each of said first conductive probes is at said back side and a contact end of
13 each of said first conductive probes extends a selected distance beyond said
14 working surface;

15 extending a second conductive probe having a first end and a contact end
16 through at least one of said multiplicity of apertures; and

17 positioning said multiplicity of apertures such that said contact ends of
18 said first conductive probes and said second conductive probes are aligned to
19 make electrical contact with at least a portion of said array of spherical contact
20 points of a circuit placed against said apparatus and wherein said contact end of
21 said first conductive probes and said second conductive probes are substantially
22 flat.

1 12. (previously presented) The method of Claim 11 further comprising the steps
2 of placing circuitry having an array of contact points against said apparatus and
3 testing said circuitry.

1 13. (original) The method of claim 11 wherein a selected probe of said
2 multiplicity of first conductive probes is for supplying a selected voltage and said
3 second conductive probe adjacent said selected probe is for sensing a voltage.

1 14. (previously presented) A method of manufacturing apparatus for
2 simultaneously making electrical contact with an array of spherical contact points
3 on circuits, having said array of contact points positioned according to a first
4 selected pattern, comprising the steps of:

5 providing a support substrate having a backside and a working surface;
6 extending a multiplicity of first conductive probes through said support
7 substrate, each of said first conductive probes extending from a first end at said
8 backside of said substrate, through said substrate to a contact end, said contact
9 ends of said conductive probes extending a selected distance beyond said
10 working surface and terminating at a multiplicity of locations according to a
11 second selected pattern corresponding to a mirror image of said first selected
12 pattern;

13 extending at least one second conductive probe having a first end and a
14 contact end through said substrate, said contact end of said at least one second
15 conductive probe terminating adjacent the contact end of one of said multiplicity
16 of first conductive probes; and

17 positioning said first conductive probes and said second conductive probe
18 such that said contact ends of said first conductive probes and said second
19 conductive probe are aligned so as to make electrical contact with said array of
20 spherical contact points of a circuit placed against said apparatus and wherein
21 said contact ends of said first and second conductive probes are substantially
22 flat.

1 15. (previously presented) The method of Claim 14 further comprising the
2 steps of placing circuitry having an array of contact points against said apparatus
3 and testing said circuitry.

1 16. (original) The method of claim 14 wherein a selected probe of said
2 multiplicity of first conductive probes is for supplying a selected voltage and said
3 second conductive probe adjacent said selected probe is for sensing voltage.

Claims 17-22 (canceled)

1 23. (currently amended) The apparatus of Claim 7 wherein said conductive
2 probes have a footprint at least as large as a the solder ball diameter of the
3 spherical contact points.

1 24. (currently amended) The apparatus of Claim 7 wherein said conductive
2 probes have a footprint smaller than a approximately as large as the solder ball
3 diameter of the spherical contact points.

1 25. (currently amended) The method of Claim 11 wherein said conductive
2 probes have a footprint at least as large as a the solder ball diameter of the
3 spherical contact points.

1 26. (currently amended) The method of Claim 11 wherein said conductive
2 probes have a footprint smaller than a approximately as large as the solder ball
3 diameter of the spherical contact points.

1 27. (currently amended) The method of Claim 14 wherein said conductive
2 probes have a footprint at least as large as a the solder ball diameter of the
3 spherical contact points.

1 28. (currently amended) The method of Claim 14 wherein said conductive
2 probes have a footprint smaller than a approximately as large as the solder ball
3 diameter of the spherical contact points.